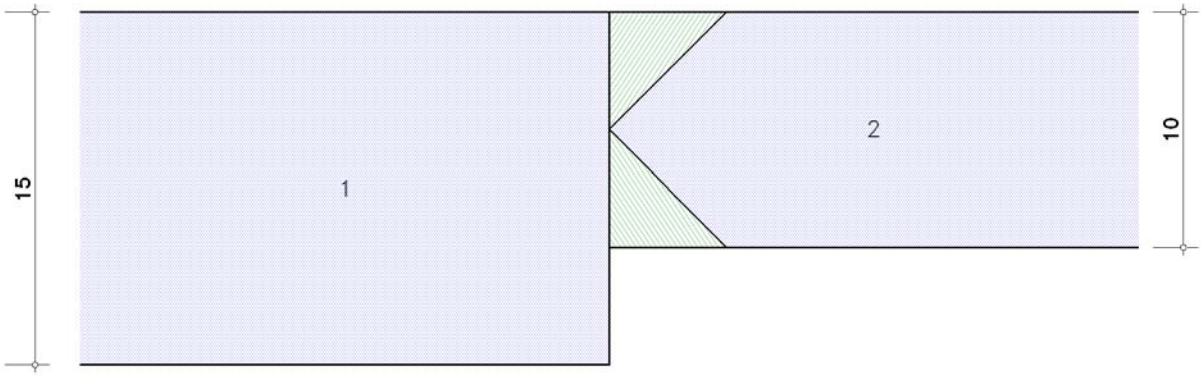
1. Welded Connection

EC 3-1-8 (04.25), NA: Deutschland

1.1. input report



connection device
butt weld (full penetrated), weld length l_w = 200.0 mm, splice
connection plates
plate 1 with thickness t_1 = 15.0 mm
plate 2 with thickness t_2 = 10.0 mm
steel grade S235
verifications
directional method
design member forces in the connection plate 2
axial force N_{Ed} = 150.00 kN
internal moment perpendicular to weld axis $M_{s,Ed}$ = 10.00 kNm
shear force perpendicular to weld axis $V_{s,Ed}$ = 150.00 kN
partial safety factors for material
resistance of bolts, welds, plates in bearing γ_{M2} = 1.25

1.2. resistance

effective weld thickness a = min(t_1,t_2) = 10.0 mm
effective weld length $l_{eff} = l_w$ = 200.0 mm
resistance of a full penetrated butt weld
design values of maximum forces:
$F_{N,Ed} = (N_{Ed} + M_{s,Ed} \cdot 6/l_{eff}) / l_{eff}$ = 2250.00 kN/m
$F_{Vs,Ed} = V_{s,Ed} / l_{eff}$ = 750.00 kN/m
design values of loads, acting on the effective weld area (α = 90.00°):
$F_{Ed}(\sigma_s) = F_{N,Ed} \cdot \sin(\alpha) + F_{Vs,Ed} \cdot \cos(\alpha)$ = 2250.00 kN/m
$F_{Ed}(\tau_s) = F_{N,Ed} \cdot \cos(\alpha) - F_{Vs,Ed} \cdot \sin(\alpha)$ = -750.00 kN/m
$F_{Ed}(\tau_p)$ = 0
design value of resulting load, acting on the effective weld area:
$F_{w,Ed} = (F_{Ed}(\sigma_s)^2 + F_{Ed}(\tau_s)^2 + F_{Ed}(\tau_p)^2)^{1/2}$ = 2371.71 kN/m
resistance of a full penetrated butt weld: $F_{w,Rd} = 0.9 \cdot f_u \cdot a/\gamma_{M2}$ = 2592.00 kN/m, f_u = 360.0 N/mm² (plate 1)
$F_{w,Ed}$ = 2371.71 kN/m < $F_{w,Rd}$ = 2592.00 kN/m ⇒ U = 0.915 < 1 ok

maximum utilization U_{max} = 0.915 < 1 ok

verification succeeded

2. Regulations

EN 1990, Eurocode 0: Grundlagen der Tragwerksplanung;
Deutsche Fassung EN 1990:2002 + A1:2005 + A1:2005/AC:2010, Ausgabe Dezember 2010
EN 1990/NA, Nationaler Anhang zur EN 1990, Ausgabe Dezember 2010

EN 1993-1-1, Eurocode 3: Bemessung und Konstruktion von Stahlbauten -
Teil 1-1: Allgemeine Bemessungsregeln und Regeln für den Hochbau;
Deutsche Fassung EN 1993-1-1:2022, Ausgabe April 2025
EN 1993-1-1/A1, Ergänzungen zur EN 1993-1-1, Ausgabe Juli 2014
EN 1993-1-1/NA, Nationaler Anhang zur EN 1993-1-1, Ausgabe Oktober 2022

EN 1993-1-8, Eurocode 3: Bemessung und Konstruktion von Stahlbauten -
Teil 1-8: Bemessung von Anschlüssen;
Deutsche Fassung EN 1993-1-8:2024, Ausgabe April 2025
EN 1993-1-8/NA, Nationaler Anhang zur EN 1993-1-8, Ausgabe November 2020